



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/586,347

07/14/2006

Mats Hedman

1509-1065

2792

466

7590

04/29/2008

YOUNG & THOMPSON

209 Madison Street

Suite 500

ALEXANDRIA, VA 22314

EXAMINER

VILAKAZI, SIZO BINDA

ART UNIT

PAPER NUMBER

4147

MAIL DATE

DELIVERY MODE

04/29/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/586,347	<b>Applicant(s)</b> HEDMAN, MATS	
	<b>Examiner</b> SIZO B. VILAKAZI	<b>Art Unit</b> 4147	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/14/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

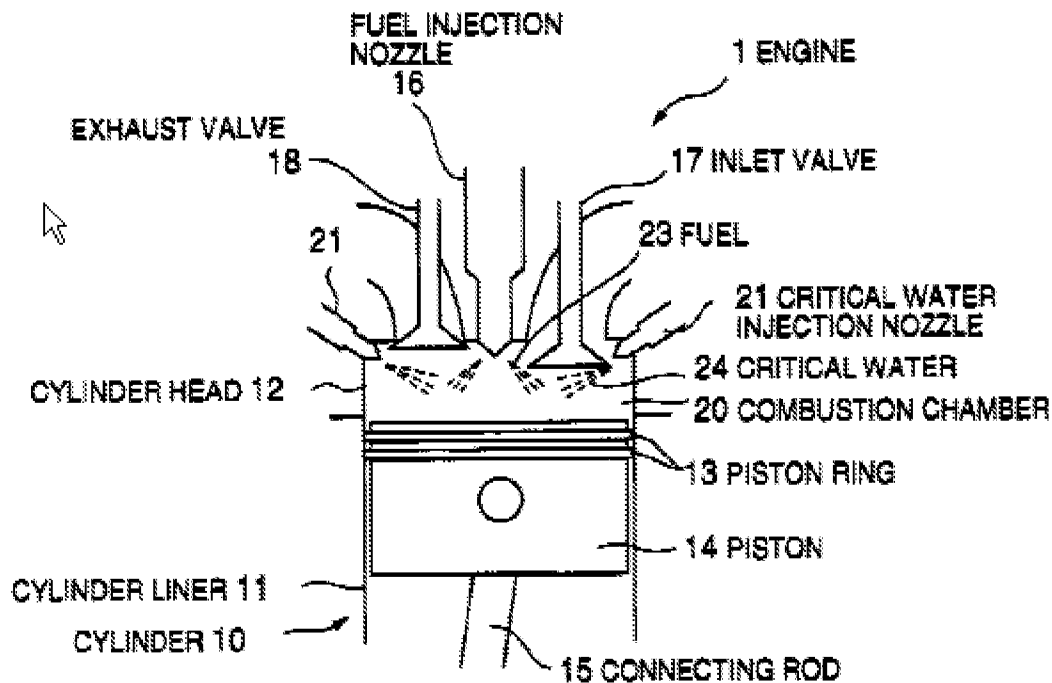
1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 7, 10-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Yuki et al. (PG Pub 2004-0003781 A1).

**FIG. 1**



3. In re Claim 1, with reference to Fig. 1, Yuki et al. disclose a method of compressing a medium in the combustion chamber (20) of a combustion engine (1), by which method a liquid, in the state of a spray (24), is introduced into the compression chamber during a compression stroke, and the liquid is pressurized and heated before it is introduced into the compression chamber to such a degree that at least a part of the droplets of the spray explode spontaneously upon entrance in the compression chamber:

- a. the liquid being pressurized to such an extent that, at the moment of introduction, it has a steam pressure that is above the pressure that, at the

moment of introduction, exists in the compression chamber (inherent, steam must be at a higher pressure to be injected), and

b. the liquid being heated to such an extent that, at the moment of introduction, it has a temperature that exceeds the boiling point of the liquid for the temperature and the pressure that, at the moment of introduction, exists in the compression chamber (Paragraph [0024], Lines 1-2), and

c. the liquid being water, characterized in that the liquid is heated to such an extent that, at the moment of introduction it has a temperature that is below the temperature of the medium at the moment of introduction of the liquid (Paragraph [0057], Lines 3-5).

4. In re Claim 2, Yuki et al. disclose a method of compression of a medium in a compression chamber of a compressor, by which method a liquid, in a state of a spray, is introduced into the compression chamber during a compression stroke, characterized in that the liquid is pressurized and heated before being introduced into the compression chamber, to such an extent that at least a part of the droplets of the spray explodes spontaneously upon entrance into the compression chamber.

5. The examiner notes that the water is heated and pressurized to supercritical levels before injection (Paragraph [0024], Lines 1-2), so when the supercritical water is depressurized upon entry into the compression chamber, the explosion of the water begins as the supercritical water enters the gas phase.

6. In re Claim 3 Yuki et al. disclose a method according to claim 2, characterized in that the liquid is pressurized to such an extent, at the moment of introduction, it has a

Art Unit: 4147

steam pressure that is above the pressure that, at the moment of introduction, exists in the compression chamber (inherent, steam must be at a higher pressure to be injected)

7. In re Claim 4 Yukio et al. disclose a method according to claim 2, characterized in that the liquid is heated to such an extent that, at the moment of introduction, it has a temperature that is above the boiling point of the liquid for the temperature and the pressure that, at the moment of introduction, exists in the compression chamber (Paragraph [0024], Lines 1-2).

8. The examiner notes that when the pressure of supercritical water is reduced to a given pressure below the critical point while maintaining the same temperature, the supercritical water enters the gas phase, thus, the temperature is above the boiling point at the given pressure.

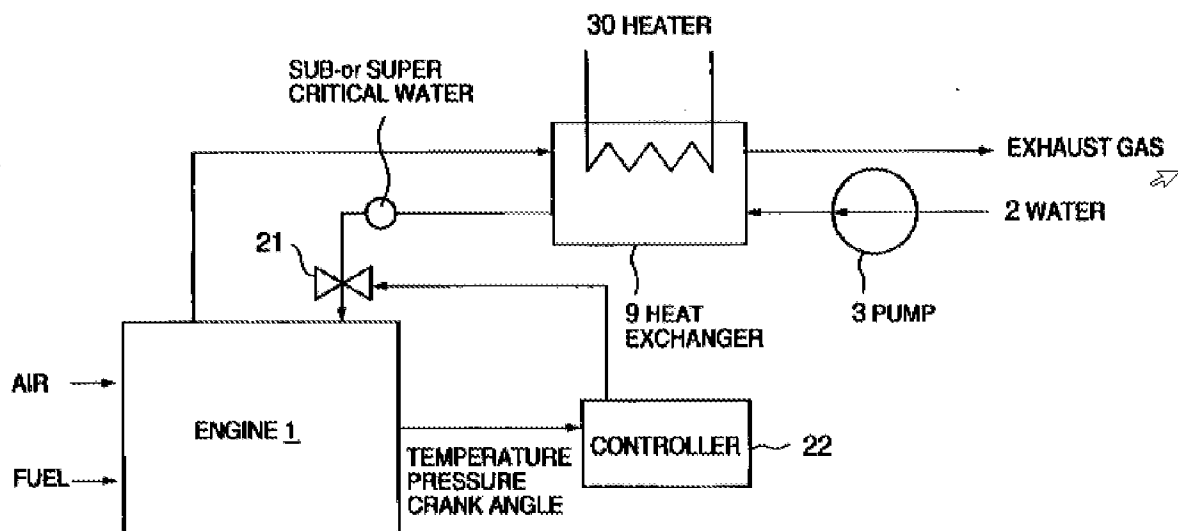
9. In re Claim 5, Yukio et al. disclose a method according to claims 2, characterized in that the liquid is heated to such an extent that, at the moment of introduction, it has a temperature that is below the temperature of the medium at the moment of introduction (Paragraph [0057], Lines 3-5).

10. In re Claim 7, Yukio et al. disclose a method according to claim 6, characterized in that the liquid and fuel are introduced simultaneously (Paragraph [0051], Lines 1-7).

11. In re Claim 10, Yukio et al. disclose a method according to claim 1, characterized in that the liquid that is introduced is water (Paragraph [0050]) and that the medium that is compressed in the compression chamber is air (Paragraph [0045]).

12. In re Claim 11, Yukio et al. disclose a method according to 10 characterized in that the water is introduced into the cylinder space when the pressure in the latter is equal to or more than 4, 5 bar (Paragraph [0006], Lines 5-6).

**FIG.4**



13. In re Claim 12, with reference to Fig. 4 above, Yukio et al. disclose a system for controlling a device for the compression of a medium in the compression chamber of a combustion engine or a compressor, by which a liquid, in the state of a spray, is introduced into the compression chamber during a compression stroke, comprising means for pressurizing (3) and heating (30) said liquid and means for introducing the liquid into the compression chamber, and means for determining the pressure and/or the temperature in the compression chamber, characterized in that it comprises a

control unit (22) that is operatively connected with the means for determining the pressure and/or the temperature and with the means for pressurizing and heating the liquid, and including a computer program which is adapted for the purpose of controlling the means for the introduction of the liquid into the compression chamber upon basis of the information concerning the pressure and the temperature in the compression chamber and in accordance with the method according to anyone of claims 1-11 (Paragraph [0057], Lines 1-12).

14. With regards to the “means for pressurizing and heating said liquid” within claim 12, this limitation meets the three-prong test per MPEP 2181 and thereby invokes 35 USC 112 6<sup>th</sup> paragraph. The “means for pressurizing and heating said liquid” are explained on Page 17, Lines 8-12 in the specification. Yuki et al. teach a means for pressurizing and heating said liquid (Paragraph [0060], Lines 1-5). The method taught by Yuki et al. is considered to be an equivalent method of pressurizing and heating said liquid.

15. With regards to the “means for introducing the liquid into the compression chamber” within claim 12, this limitation meets the three-prong test per MPEP 2181 and thereby invokes 35 USC 112 6<sup>th</sup> paragraph. The “means for introducing the liquid into the compression chamber” are explained on Page 17, Lines 6-7 in the specification. Yuki et al. teach a means for introducing the liquid into the compression chamber (Paragraph [0061], Lines 1-5). The method taught by Yuki et al. is considered to be an equivalent method of the liquid into the compression chamber.

16. With regards to the “means for determining the pressure and/or temperature in the compression chamber” within claim 12, this limitation meets the three-prong test per MPEP 2181 and thereby invokes 35 USC 112 6<sup>th</sup> paragraph. The “means for determining the pressure and/or temperature in the compression chamber” are explained from Page 17, Lines 15-17 in the specification. Yuki et al. teach a means for determining the pressure and/or temperature in the compression chamber (Paragraph [0056], Lines 4-7). The method taught by Yuki et al. is considered to be an equivalent method of determining the pressure and/or temperature in the compression chamber.

17. In re Claim 13, Yukio et al. disclose a method according to claim 3, wherein the liquid is heated to such an extent that, at the moment of introduction, it has a temperature that is below the temperature of the medium at the moment of introduction (Paragraph [0057], Lines 3-5).

18. In re Claim 14, Yukio et al. disclose a method according to claim 4 wherein the liquid is heated to such an extent that, at the moment of introduction, it has a temperature that is below the temperature of the medium at the moment of introduction (Paragraph [0057], Lines 3-5).

### ***Claim Rejections - 35 USC § 103***

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuki et al in view of Tosa et al. (US Patent 5,170,751).

21. In re Claim 6, Yuki et al. has been discussed above, does not disclose a combustion engine wherein the liquid is introduced through a valve that is used by the combustion engine for the purpose of introduction of fuel.

22. However, Tosa et al. do disclose the above mentioned liquid/fuel combination valve (Column 1, Lines 49-51) for the purpose of achieving a more compact and practical design.

23. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have applied the liquid/fuel combination valve as disclosed by Tosa et al. to the combustion engine disclosed by Yuki et al. in order to achieve a more compact and practical design.

24. Claims 8-9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuki et al in view of Posselt (US Patent 5,992,353).

25. In re Claim 8, Yuki et al has been discussed above, but does not disclose the compression method as disclosed in the claim.

26. However, Posselt discloses a method wherein a mixture of the previously compressed medium and the vaporized liquid is evacuated after the compression, and in that the liquid, after said evacuation, is separated by means of condensation (Column 3, Lines 53-55) in order to conserve water.

27. Thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system disclosed by Yuki et al. with the condensation system disclosed by Posselt for conservation purposes.

28. In re Claim 9, Posselt discloses a method according to claim 8, characterized in that the liquid is refined from solid contamination and is re-transported to a suitable storing chamber (Column 3, Lines 53-58) in order to insure that solid contamination doesn't degrade the performance of the system.

### ***Conclusion***

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Binion (US Patent 5,718,194) and Chomiak (US Patent 6,463,890 B1) disclose methods of operating engines including water/steam injection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIZO B. VILAKAZI whose telephone number is (571)270-3926. The examiner can normally be reached on M- F: 9:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, George Nguyen can be reached on (571) 272-4491. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 4147

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sizo B Vilakazi  
Examiner  
Art Unit 4147

/George Nguyen/  
Supervisory Patent Examiner, Art Unit 4147